CLAIMS

What is claimed is:

1. A device for lysing components of a fluid sample, the device comprising:
   - a) a cartridge having:
     - i) an inlet port for introducing the sample into the cartridge;
     - ii) a lysing chamber containing a membrane or filter for capturing the sample components as the sample flows through the lysing chamber;
     - iii) an outlet port for exit of the sample from the lysing chamber; and
     - iv) beads in the lysing chamber for rupturing the sample components; and
   - b) an ultrasonic transducer for transferring ultrasonic energy to the lysing chamber to agitate the beads and thereby rupture the components, wherein the transducer is coupled to a wall of the lysing chamber.

2. The device of claim 1, wherein the transducer comprises an ultrasonic horn.

3. The device of claim 1, wherein the wall comprises a polymeric film having a thickness in the range of 0.01 to 0.5 mm.

4. A method for lysing components of a fluid sample, the method comprising the steps of:
   - a) introducing the sample into a cartridge having:
     - i) a lysing chamber; and

ii) at least one solid phase positioned in the lysing chamber;

b) forcing the sample to flow through the lysing chamber to capture the sample components with the solid phase;

c) coupling an ultrasonic transducer to a wall of the lysing chamber; and

d) transferring ultrasonic energy from the transducer to the sample components.

5. The method of claim 4, wherein the solid phase comprises a membrane or filter for capturing the sample components, and the method further comprises the step of agitating beads in the lysing chamber to rupture the sample components.

6. The method of claim 4, wherein the transducer comprises an ultrasonic horn.

7. The method of claim 6, wherein the solid phase comprises a filter, and wherein the horn is coupled to the wall of the chamber such that the longitudinal axis of the horn is substantially perpendicular to the filter.

8. The method of claim 4, wherein the wall comprises a plastic film having a thickness in the range of 0.01 to 0.5 mm.

9. The method of claim 4, wherein the volume of the sample forced to flow through the lysing chamber is greater than the volume capacity of the lysing chamber.

10. The method of claim 4, wherein the volume of sample forced to flow through the lysing chamber is at least 1 ml.

11. The method of claim 4, further comprising the step of heating the sample components while transferring the ultrasonic energy.

12. A device for lysing components of a fluid sample, the device comprising:

a) a cartridge having a lysing chamber for receiving the fluid sample;

b) at least one solid phase positioned in the lysing chamber for capturing the sample components to be lysed; and

c) an ultrasonic transducer for transferring ultrasonic energy to the captured sample components, wherein the cartridge includes at least one wall defining the lysing chamber, and wherein the transducer is coupled to the wall.

13. The device of claim 12, further comprising beads in the lysing chamber for rupturing the sample components.

14. The device of claim 12, wherein the transducer comprises an ultrasonic horn.

15. The device of claim 14, wherein the solid phase comprises a filter, and wherein the horn is coupled to the wall such that the longitudinal axis of the horn is substantially perpendicular to the filter.

16. The device of claim 12, wherein the wall comprises a plastic film having a thickness in the range of 0.01 to 0.5 mm.

17. The device of claim 12, wherein the lysing chamber has an inlet port and an outlet port, and wherein the ports are positioned to permit continuous fluid flow through the lysing chamber.

18. A method for lysing components of a fluid sample, the method comprising the steps of:

a) introducing the sample into a cartridge having a lysing chamber, wherein the lysing chamber contains a membrane or filter for capturing the sample components;

b) forcing the sample to flow through the lysing chamber to capture the sample components with the membrane or filter; and

c) agitating beads in the lysing chamber to lyse the sample components, wherein the beads are agitated by transferring ultrasonic energy to the lysing chamber using an ultrasonic transducer coupled to a wall of the chamber.

19. The method of claim 18, wherein the volume of sample forced to flow through the lysing chamber is at least 1 ml.

20. The method of claim 18, further comprising the step of heating the sample components while transferring the ultrasonic energy.

21. The method of claim 18, wherein the wall comprises a plastic film having a thickness in the range of 0.01 to 0.5 mm.